

Nokia Mobile Phones  
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There is a need for Midi content that can be applied in a coherent way by devices that have different capabilities, without the need for optimisation. It should be possible for the content creators to predict how a given Midi song is going to sound in the various devices. This is not the case with the current proposed standard, at least for two reasons. There are big differences between the various GM bank implementations because of e.g. different synthesis technologies. In mobile devices the limitations of the small transducers add further variation to the final sound of a given Midi song.

To support the creation of more predictable content, we propose an instrument bank with reduced amount of instruments. The proposed solution is a subset of GM instruments that only includes the most generic and descriptive instruments. This subset is associated with a mapping practice that connects all GM instrument program numbers to the instruments in the reduced set. The mapping supports GM compatibility both upwards and downwards.

The method for structuring the bank is the following. Full GM bank is divided into groups of instruments that share significant characteristics in timbre, envelope, and musical function. The idea is that the instruments in a given group can replace each others without major effects to the basic musical feel of the song. The most generic instrument from each group is then selected to replace the other instruments in the same group.

The boundaries of the traditional GM grouping are crossed in cases where similarities exist between instruments from different GM groups. For example, in terms of timbre and envelope, guitar and banjo are more similar to each others than banjo and bagpipe, although guitar and banjo belong to different GM groups while banjo and bagpipe belong to the same GM group.

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**Table 1. Melodic instrument groups**

The first instrument in each group can be used to replace the rest of the instruments.

MIDI #	Patch name	MIDI #	Patch name	MIDI #	Patch name	MIDI #	Patch name
1	<b>Acoustic Piano</b>	12	<b>Vibraphone</b>	17	<b>Drawbar Organ</b>	28	<b>Electric Guitar (clean)</b>
2	Bright Acoustic Piano	9	Celesta	18	Percussive Organ	25	Acoustic Guitar (nylon)
3	Electric Grand Piano	10	Glockenspiel	19	Rock Organ	26	Acoustic Guitar (steel)
4	Honky-tonk Piano	11	Music Box	20	Church Organ	27	Electric Guitar (jazz)
5	Electric Piano1	13	Marimba	21	Reed Organ	29	Electric Guitar (muted)
6	Electric Piano 2	14	Xylophone	22	Accordion	30	Overdriven Guitar
7	Harpsichord	15	Tubular Bells	23	Harmonica	31	Distortion Guitar
8	Clavi	16	Dulcimer	24	Tango Accordion	32	Guitar Harmonics
		47	Orchestral Harp	56	Orchestra Hit	105	Sitar
		109	Kalimba	110	Bag pipe	106	Banjo
						107	Shamisen
						108	Koto
34	<b>Electric Bass (finger)</b>	41	<b>Violin</b>	49	<b>Strings</b>	57	<b>Trumpet</b>
33	Acoustic Bass	42	Viola	45	Tremolo Strings	58	Trombone
35	Electric Bass (pick)	43	Cello	50	String Ensembles 2	59	Tuba
36	Fretless Bass	44	Contrabass	51	Synth Strings 1	60	Muted Trumpet
37	Slap Bass 1	46	Pizzicato Strings	52	Synth Strings 2	61	French Horn
38	Slap Bass 2	111	Fiddle			62	Brass Section
39	Synth Bass 1					63	Synth Brass 1
40	Synth Bass 2					64	Synth Brass 2
67	<b>Tenor Sax</b>	74	<b>Flute</b>	82	<b>Lead (Saw)</b>	90	<b>Pad</b>
65	Soprano Sax	69	Oboe	81	Lead 1 (square)	53	Choir Aahs
66	Alto Sax	70	English Horn	83	Lead 3 (calliope)	54	Voice Oohs
68	Baritone Sax	71	Bassoon	84	Lead 4 (chiff)	55	Synth Voice
112	Shanai	72	Clarinet	85	Lead 5 (charang)	89	Pad 1 (new age)
		73	Piccolo	86	Lead 6 (voice)	91	Pad 3 (polysynth)
		75	Recorder	87	Lead 7 (fifths)	92	Pad 4 (choir)
		76	Pan Flute	88	Lead 8 (bass +lead)	93	Pad 5 (bowed)
		77	Blown Bottle			94	Pad 6 (metallic)
		78	Shakuhachi			95	Pad 7 (halo)
		79	Whistle			96	Pad 8 (sweep)
		80	Ocarina				
115	<b>Pitched Percussion</b>	125	<b>Telephone</b>				
48	Timpani	97	FX 1 (rain)				
113	Tinkle Bell	98	FX 2 (soundtrack)				
114	Agogo	99	FX 3 (crystal)				
116	Woodblock	100	FX 4 (atmosphere)				
117	Taiko Drum	101	FX 5 (brightness)				
118	Melodic Tom	102	FX 6 (goblins)				
119	Synth Drum	103	FX 7 (echoes)				
		104	FX 8 (sci-fi)				
		120	Reverse Cymbal				
		121	Guitar Fret Noise				
		122	Breath Noise				
		123	Seashore				
		124	Bird Tweet				
		126	Helicopter				
		127	Applause				
		128	Gunshot				

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## Table 2. Percussive instrument groups

The first instrument in each group can be used to replace the rest of the instruments.

**Key Key # Sound name**

B2	36	<b>Bass drum</b>
	35	Acoustic Bass Drum

E2	40	<b>Electric Snare</b>
	38	Acoustic Snare

F #2	42	<b>Closed Hihat</b>
	44	Pedal Hi-hat [EXC1]
	71	Short Whistle [EXC2]
	80	Mute Triangle [EXC5]

Bb2	46	<b>Open Hihat</b>
	55	Splash Cymbal
	58	Vibra-slap
	74	Long Guiro [EXC3]
	81	Open Triangle [EXC5]
	72	Long Whistle [EXC2]

D3	50	<b>High Tom</b>
	48	High Mid Tom

A2	45	<b>Low Tom</b>
	43	High Floor Tom
	41	Low Floor Tom
	47	Low-Mid Tom

C #3	49	<b>Crash</b>
	57	Crash Cymbal 2

**Key Key # Sound name**

D #3	51	<b>Ride</b>
	52	Chinese Cymbal
	53	Ride Bell
	59	Ride Cymbal 2

F #3	54	<b>Tambourine</b>
	39	Hand Clap

D4	62	<b>Mute High Conga</b>
	60	High Bongo
	65	High Timbale
	78	Mute Cuica [EXC4]

E4	64	<b>Low Conga</b>
	61	Low Bongo
	63	Open Hi Conga
	66	Low Timbale
	79	Open Cuica [EXC4]

Bb4	70	<b>Maracas</b>
	69	Cabasa
	73	Short Guiro [EXC3]

D #5	75	<b>Claves</b>
	37	Side stick
	56	Cowbell
	67	High Agogo
	68	Low Agogo
	76	High Wood Block
	77	Low Wood Block

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**Table 3. Melodic instrument list**

All melodic GM instruments with the proposed mapping.

Patch #	Patch name	->	Patch #	Patch name	Patch #	Patch name	->	Patch #	Patch name
1	<b>Acoustic Grand Piano</b>		1	Acoustic Grand Piano	65	Soprano Sax		67	Tenor Sax
2	Bright Acoustic Piano		1	Acoustic Grand Piano	66	Alto Sax		67	Tenor Sax
3	Electric Grand Piano		1	Acoustic Grand Piano	67	<b>Tenor Sax</b>		67	Tenor Sax
4	Honky-tonk Piano		1	Acoustic Grand Piano	68	Baritone Sax		67	Tenor Sax
5	Electric Piano1		1	Acoustic Grand Piano	69	Oboe		74	Flute
6	Electric Piano 2		1	Acoustic Grand Piano	70	English Horn		74	Flute
7	Harpsichord		1	Acoustic Grand Piano	71	Bassoon		74	Flute
8	Clavi		1	Acoustic Grand Piano	72	Clarinet		74	Flute
9	Celesta		12	Vibraphone	73	Piccolo		74	Flute
10	Glockenspiel		12	Vibraphone	74	<b>Flute</b>		74	Flute
11	Music Box		12	Vibraphone	75	Recorder		74	Flute
12	<b>Vibraphone</b>		12	Vibraphone	76	Pan Flute		74	Flute
13	Marimba		12	Vibraphone	77	Blown Bottle		74	Flute
14	Xylophone		12	Vibraphone	78	Shakuhachi		74	Flute
15	Tubular Bells		12	Vibraphone	79	Whistle		74	Flute
16	Dulcimer		12	Vibraphone	80	Ocarina		74	Flute
17	<b>Drawbar Organ</b>		17	Drawbar Organ	81	Lead 1 (square)		82	Lead 2 (sawtooth)
18	Percussive Organ		17	Drawbar Organ	82	<b>Lead 2 (sawtooth)</b>		82	Lead 2 (sawtooth)
19	Rock Organ		17	Drawbar Organ	83	Lead 3 (callopie)		82	Lead 2 (sawtooth)
20	Church Organ		17	Drawbar Organ	84	Lead 4 (chiff)		82	Lead 2 (sawtooth)
21	Reed Organ		17	Drawbar Organ	85	Lead 5 (charang)		82	Lead 2 (sawtooth)
22	Accordion		17	Drawbar Organ	86	Lead 6 (voice)		82	Lead 2 (sawtooth)
23	Harmonica		17	Drawbar Organ	87	Lead 7 (fifths)		82	Lead 2 (sawtooth)
24	Tango Accordion		17	Drawbar Organ	88	Lead 8 (bass + lead)		82	Lead 2 (sawtooth)
25	Acoustic Guitar (nylon)		28	Electric Guitar (clean)	89	Pad 1 (new age)		90	Pad 2 (warm)
26	Acoustic Guitar (steel)		28	Electric Guitar (clean)	90	<b>Pad 2 (warm)</b>		90	Pad 2 (warm)
27	Electric Guitar (jazz)		28	Electric Guitar (clean)	91	Pad 3 (polysynth)		90	Pad 2 (warm)
28	<b>Electric Guitar (clean)</b>		28	Electric Guitar (clean)	92	Pad 4 (choir)		90	Pad 2 (warm)
29	Electric Guitar (muted)		28	Electric Guitar (clean)	93	Pad 5 (bowed)		90	Pad 2 (warm)
30	Overdriven Guitar		28	Electric Guitar (clean)	94	Pad 6 (metallic)		90	Pad 2 (warm)
31	Distortion Guitar		28	Electric Guitar (clean)	95	Pad 7 (halo)		90	Pad 2 (warm)
32	Guitar Harmonics		28	Electric Guitar (clean)	96	Pad 8 (sweep)		90	Pad 2 (warm)
33	Acoustic Bass		34	Electric Bass (finger)	97	FX 1 (rain)		125	Telephone
34	<b>Electric Bass (finger)</b>		34	Electric Bass (finger)	98	FX 2 (soundtrack)		125	Telephone
35	Electric Bass (pick)		34	Electric Bass (finger)	99	FX 3 (crystal)		125	Telephone
36	Fretless Bass		34	Electric Bass (finger)	100	FX 4 (atmosphere)		125	Telephone
37	Slap Bass 1		34	Electric Bass (finger)	101	FX 5 (brightness)		125	Telephone
38	Slap Bass 2		34	Electric Bass (finger)	102	FX 6 (goblins)		125	Telephone
39	Synth Bass 1		34	Electric Bass (finger)	103	FX 7 (echoes)		125	Telephone
40	Synth Bass 2		34	Electric Bass (finger)	104	FX 8 (sci-fi)		125	Telephone
41	<b>Violin</b>		41	Violin	105	Sitar		28	Electric Guitar (clean)
42	Viola		41	Violin	106	Banjo		28	Electric Guitar (clean)
43	Cello		41	Violin	107	Shamisen		28	Electric Guitar (clean)
44	Contrabass		41	Violin	108	Koto		28	Electric Guitar (clean)
45	Tremolo Strings		49	String Ensembles 1	109	Kalimba		12	Vibraphone
46	Pizzicato Strings		41	Violin	110	Bag pipe		17	Drawbar Organ
47	Orchestral Harp		12	Vibraphone	111	Fiddle		41	Violin
48	Timpani		115	Steel Drums	112	Shanai		67	Tenor Sax
49	<b>String Ensembles 1</b>		49	String Ensembles 1	113	Tinkle Bell		115	Steel Drums
50	String Ensembles 2		49	String Ensembles 1	114	Agogo		115	Steel Drums
51	Synth Strings 1		49	String Ensembles 1	115	<b>Steel Drums</b>		115	Steel Drums
52	Synth Strings 2		49	String Ensembles 1	116	Woodblock		115	Steel Drums
53	Choir Aahs		90	Pad 2 (warm)	117	Taiko Drum		115	Steel Drums
54	Voice Oohs		90	Pad 2 (warm)	118	Melodic Tom		115	Steel Drums
55	Synth Voice		90	Pad 2 (warm)	119	Synth Drum		115	Steel Drums
56	Orchestra Hit		17	Drawbar Organ	120	Reverse Cymbal		125	Telephone
57	<b>Trumpet</b>		57	Trumpet	121	Guitar Fret Noise		125	Telephone
58	Trombone		57	Trumpet	122	Breath Noise		125	Telephone
59	Tuba		57	Trumpet	123	Seashore		125	Telephone
60	Muted Trumpet		57	Trumpet	124	Bird Tweet		125	Telephone

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**Table 4. Percussive instrument list**

All percussive GM instruments with the proposed mapping

Key #	Sound name	->	Key #	Sound name	Key #	Sound name	->	Key #	Sound name
35	Acoustic Bass Drum		36	Bass Drum 1	59	Ride Cymbal 2		51	Ride Cymbal 1
36	<b>Bass Drum 1</b>		36	Bass Drum 1	60	High Bongo		62	Mute Hi Conga
37	Side stick		75	Claves	61	Low Bongo		64	Low Conga
38	Acoustic Snare		40	Electric Snare	62	<b>Mute Hi Conga</b>		62	Mute Hi Conga
39	Hand Clap		54	Tambourine	63	Open Hi Conga		64	Low Conga
40	<b>Electric Snare</b>		40	Electric Snare	64	<b>Low Conga</b>		64	Low Conga
41	Low Floor Tom		45	Low Tom	65	High Timbale		62	Mute Hi Conga
42	<b>Closed Hi-hat [EXC1]</b>		42	Closed Hi-hat [EXC1]	66	Low Timbale		64	Low Conga
43	High Floor Tom		45	Low Tom	67	High Agogo		75	Claves
44	Pedal Hi-hat [EXC1]		42	Closed Hi-hat [EXC1]	68	Low Agogo		75	Claves
45	<b>Low Tom</b>		45	Low Tom	69	Cabasa		70	Maracas
46	<b>Open Hi-hat [EXC1]</b>		46	Open Hi-hat [EXC1]	70	<b>Maracas</b>		70	Maracas
47	Low-Mid Tom		45	Low Tom	71	Short Whistle [EXC2]		42	Closed Hi-hat [EXC1]
48	High Mid Tom		50	High Tom	72	Long Whistle [EXC2]		46	Open Hi-hat [EXC1]
49	<b>Crash Cymbal 1</b>		49	Crash Cymbal 1	73	Short Guiro [EXC3]		70	Maracas
50	<b>High Tom</b>		50	High Tom	74	Long Guiro [EXC3]		46	Open Hi-hat [EXC1]
51	<b>Ride Cymbal 1</b>		51	Ride Cymbal 1	75	<b>Claves</b>		75	Claves
52	Chinese Cymbal		51	Ride Cymbal 1	76	High Wood Block		75	Claves
53	Ride Bell		51	Ride Cymbal 1	77	Low Wood Block		75	Claves
54	<b>Tambourine</b>		54	Tambourine	78	Mute Cuica [EXC4]		62	Mute Hi Conga
55	Splash Cymbal		46	Open Hi-hat [EXC1]	79	Open Cuica [EXC4]		64	Low Conga
56	Cowbell		75	Claves	80	Mute Triangle [EXC5]		42	Closed Hi-hat [EXC1]
57	Crash Cymbal 2		49	Crash Cymbal 1	81	Open Triangle [EXC5]		46	Open Hi-hat [EXC1]
58	Vibra-slap		46	Open Hi-hat [EXC1]					